

## REMARKS

### Claim Renumbering

As requested by the Examiner, the claims have been renumbered beginning with 42. Upon entry of this amendment, claims 42-70 will be pending in the application, with claims 42, 57 and 62 being the independent claims.

New independent claim 42 relates to the subject matter of old claims 18, 19 and 21.

New claim 43 is dependent on claim 42 and relates to each outlet opening being arranged such that the upper surface of the base member and lower boundary of each outlet opening are substantially flush such that the upper surface of the base member extends continuously through each end wall.

New claim 44 is dependent on claim 42 and relates to the base angle "A" being greater than zero and less than 10 degrees.

New independent claim 62 relates to the subject matter of old independent claim 38 and includes the following additional features: the peripheral wall includes two side wall members and two end wall members, the molten aluminium flows substantially horizontally outwards into the mould and the raised flow deflector is substantially hemispherical with flat top.

New claim 64 is dependent on claim 63 and specifies that the side wall members are curved.

New claims 67-70 relate to the dimensions of the raised flow deflector.

### **Amendments to Specification**

Headings have been inserted into the specification, and the first paragraph has been amended as requested by the Examiner.

### **Terminal Disclaimer**

The applicants have submitted a terminal disclaimer to obviate the provisional double patenting rejection.

### **Patentability**

The current invention relates to a distributor device, the purpose of distributor device is to control the flow of aluminium into the mould, to ensure that aluminium is correctly distributed within the mould, i.e. towards the walls of the mould and then downwards towards the solidification front (see figure 7a and 7b). The liquid aluminium must be introduced into the mould below the surface of the aluminium and with minimum turbulence, to ensure that contaminants floating on the surface of the aluminium are not drawn downwards and frozen into the aluminium ingot.

In order to meet these aims, it is essential that the distributor device is sufficiently large with respect to the size of the nozzle to allow currents within the aluminium to dissipate as the aluminium flows through the distributor device before entering the mould. The distributor device is fixed in use relative to the nozzle dispensing molten aluminium, so that the flow from the nozzle through the device into the mould is more predictable and uniform. The distributor

device directs the flow towards the sides of the mould without drawing contaminants from the surface and preventing cold spots occurring, since this leads to the production of a poor quality ingot (see [0003] and [0052]). Eliminating turbulence and producing the predictable heat distribution is achieved by the geometry of the distributor device.

#### **Claim 42**

New independent claim 42 is based on the subject matter of old claim 18 and dependent claims 20 and 21 (the peripheral wall includes two side wall members and two end wall members, with at least one outlet opening in each of said end wall members, and wherein molten aluminium flows substantially horizontally outwards into the mould).

Gardner (US 2,876,509) discloses a regulator device that is adapted to float on the body of molten metal (see column 2, lines 21-27) for automatically controlling the flow rate of molten metal from the delivery means such that the molten metal level in the mould shell is substantially constant at all times (see column 2, lines 30-33). Therefore the regulating receptacle of Gardner has a different primary purpose than the distributor device of the current invention, since the distributor device is arranged to accurately control the distribution of aluminium within the mould and to reduce turbulence.

Furthermore, there are structural differences between the claimed distributor device and the receptacle disclosed in Gardner. These are:

1. the claimed distributor device is made from a refractory material whereas the receptacle of Gardner is made from stainless steel (see column 3, line 30); and

2. the sloping base is inclined downwards to the outlet openings (figure 2 shows that the base is flat apart from a throttling member 12).

The examiner has indicated that those features can be found in Gamble (US 3,850,684) and Augustine, III (US 5,227,078) respectively.

It is submitted that combining three documents in this manner requires impermissible hindsight of the invention since there is no motivation to do so in the prior art. Furthermore, the skilled person would not combine the teachings of Gardner and Augustine, since the feature of the domed diverter 31 (Augustine) is essentially the same as the throttling member 12 (Gardner). Thus the skilled person when reading Augustine would not perceive the domed diverter 31 to teach anything significantly different from the throttling member 12 of Gardner. This is clear since the domed diverter 31 is approximately the same diameter as the pouring spout in Augustine and the throttling member 12 is approximately the same diameter as the pouring spout in Gardner. Therefore if the throttling member 12 was replaced by the domed diverter 31, we would still have a situation where the base of the receptacle of Gardner would be flat with the domed diverter 31 located beneath the spout being approximately the same dimensions as the throttling member 12. That combination would not have all of the features of claim 42.

If on the other hand, the skilled person were to scale up the domed diverter 31 of Augustine such that it extends from the side walls of the receptacle of Gardner, it would be so large that it would extend above the side walls and severely restrict the volume of the receptacle thus preventing the device from working properly. This would be the case since the angle of inclination of the domed diverter 31 appears to be around 40 degrees. Thus the skilled person would reject this combination as totally unworkable. Also, even if the base was modified in that way the aluminium would not flow substantially horizontally through the outlets of the receptacle in Gardner, since the angle of inclination of the inclined base would direct the molten aluminium

through the outlets with a downward trajectory of approximately 40 degrees. Therefore the combination would not have all of the features of new claim 42. Furthermore, the combined teachings would not produce the same effect as the claimed invention, which is to direct aluminium towards the sides of the mould first and then downwards to the solidification front to produce the idealised heart shaped flow patterns within the mould and obtain good heat distribution - see Figure 7b and [0053]). Also, there is no motivation for the skilled person to scale the domed diverter 31 in this manner, since it is clear from Augustine that the domed diverter 31 should be approximately the same diameter as the spout.

Thus to arrive at the claimed invention, the skilled person would have to modify the domed inverter 31 without the prior art providing the motivation to do so, or any indication as to how the domed inverter 31 would have to be modified to arrive at the claimed invention.

For the above reasons it is respectfully submitted that claim 42 has an inventive step over the prior art.

#### **Claim 55**

Claim 55 relates to an aluminium casting installation including a distributor device according to claim 42. Since claim 55 includes all of the features of claim 42, it is respectfully submitted that claim 55 has an inventive step over the prior art.

**Claim 57**

New independent claim 57 relates to a similar distributor device to claim 42, except that instead of having a sloped base, the separation of the side wall members increases towards the ends of the side wall members. The examiner has objected to the patentability of this claim by combining the teachings of Gardner, Campbell, Augustine and also Tremblay (US 6,270,717).

It is respectfully submitted that the combination of features from those documents has been made with hindsight of the invention and without any motivation in the prior art to arrive at the claimed invention.

Tremblay is primarily concerned with heat-resistant inorganic materials for use in molten metal casting. The embodiment shown in Figure 9 appears to have side walls having increasing separation towards the end thereof. However, this is not confirmed in the text. Furthermore, there is no indication in Tremblay of the effect that feature has in relation to the flow characteristics of the molten metal. Indeed, the only text relating to that embodiment appears in column 7, lines 29-48. Therefore, even if the skilled person were to read this document, there is no hint or direction in the text to draw the skilled person's attention to the flared walls, or to the effect that it might achieve on distribution of aluminium within the mould. There is absolutely no motivation for the skilled person to select that one feature from Tremblay and try to combine it with the teachings of Gardner, Campbell and Augustine. The combination can only be made with hindsight of the invention.

Therefore it is respectfully submitted that claim 57 has an inventive step over the prior art.

**Claim 62**

New independent claim 62 relates to the subject matter of old claim 38 plus the following additional features: the peripheral wall includes two side wall members and two end wall members, the aluminium flows substantially horizontally outwards into the mould and the raised flow deflector is substantially hemispherical with a flat top.

The examiner has cited the combination of Gardner, Gamble and Augustine against old claim 38. It is respectfully submitted that new claim 62 has an inventive step over the prior art since the throttling member 12 disclosed in Gardner is arranged to control the flow rate of molten aluminium into the mould and consequently the pouring member has a specific shape that is suitable for that purpose (see figure 2 which shows a substantially conical tip). Conversely, the raised flow deflector in the claimed invention is for producing a smooth and predictable flow pattern by reducing the amount of turbulence in the aluminium as it enters the distributor device (see [0049 and 0050]). It is the hemispherical flat top shape of the raised flow deflector which makes it particularly suitable for that purpose.

Since the specific arrangement of the raised flow deflector is not disclosed in the prior art, it is respectfully submitted that new claim 62 has an inventive step over the prior art.

**Conclusion**

In light of the foregoing amendments and remarks, and also the enclosed Terminal Disclaimer, it is respectfully submitted that this application meets all statutory requirements. As such, a Notice of Allowance is respectfully requested.

Respectfully submitted,



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